

Strategy for Reducing Risks  
from Natural Hazards in  
Pawtucket, Rhode Island:  
A Multi-Hazard Mitigation Strategy



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# **Strategy for Reducing Risks from Natural Hazards in Pawtucket, Rhode Island: A Multi-Hazard Mitigation Strategy**

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**Adopted by the Pawtucket City Council**  
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## Section 1.0 – Goals and Objectives

Natural hazard mitigation is an action taken to permanently reduce or eliminate long-term risk to people and their property from the effects of natural hazards (e.g., wind, fire, flood, nor'easter, hurricane, earthquake, etc.).

### 1.1 What Mitigation Can Do for Pawtucket

An important benefit of hazard mitigation is that money spent today on preventative measures can significantly reduce the cost of post-disaster cleanup tomorrow. By planning ahead, Pawtucket will minimize the economic and social disruption that can result from floods, blizzards, or hurricanes (destruction of property, loss or interruption of jobs, and the loss of businesses).

Municipal officials in Pawtucket assessed the risks to the city and developed mitigation actions that address a mix of structural initiatives to minimize the effects of future hazards (e.g., building code enforcement, retrofitting existing structures, and removal of vulnerable structures) and nonstructural initiatives (e.g., educational programs, preventing construction in high-hazard areas, enforcing regulations). By creating this strategy, Pawtucket has established an ongoing process that will make hazard mitigation a routine part of municipal government.

Formal adoption and implementation of this hazard mitigation strategy will help Pawtucket gain credit points under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) program, which provides discounts on National Flood Insurance Program (NFIP) flood insurance premiums for residents of communities that voluntarily participate in this program. In addition, the adoption of this mitigation strategy increases Pawtucket's eligibility for federal grants for hazard mitigation which include FEMA's pre-disaster Flood Mitigation Assistance (FMA) program and FEMA's post-disaster Hazard Mitigation Grant Program (HMGP). (Refer to Appendix B for further information.)

### 1.2 Pawtucket's Mission Statement

Preserve and enhance the quality of life, property, and resources by identifying areas at risk from natural hazards and implementing priority hazard mitigation actions in order to protect the Blackstone Valley's infrastructure, population, and historical, cultural, and natural resources.

### 1.3 Hazards Assessment

The city of Pawtucket identified risks, assessed the degree of vulnerability of those areas "at risk" (e.g., structures, population, and natural resources), and examined possible impacts from natural disasters (e.g., loss of life, environmental damage, inconvenience to residents). Risk describes the characteristics of the hazard and can be defined in terms of magnitude, duration, distribution, area affected, frequency, probability. Vulnerability indicates what is likely to be damaged by the identified hazards and how severe that damage could be. With help from the University of Rhode Island (URI) Environmental Data Center, Pawtucket mapped high risk areas in the city (see maps on page 3 and page 5). These maps indicate the flood zones, repetitive loss areas, areas of historic flooding (not marked on the FEMA Flood Insurance Rate Map), evacuation routes, dams, bridges, and American Red Cross-approved shelters.

Pawtucket is a flood-prone community in which significant cultural, historical, and economic resources are at risk (see Table 1). There are also a few high-hazard dams in the city and upstream from the city that pose a risk to Pawtucket. The Blackstone River cuts through the middle of Pawtucket and flows into Narragansett Bay. The Blackstone River contains both "A-" and "V"-flood zones. An A-zone is an area that would be inundated by a 100-year flood but is not subject to velocity wave impact. A V-zone is a velocity zone that is subject to breaking wave action.

**Table 1. Summary of National Flood Insurance Program Activity in Pawtucket**

Total Policies	Value of Property Covered	Policies in V-Zone*	Policies in A-Zone*	Claims Since 1978
96	\$7,430,300	0	7	20

\* V-zone refers to the velocity zone, where waves greater than 2.9 feet are feasible during a 100-year flood. A-zone refers to other areas within the 100-year flood zone with less than 2.9-foot waves (FEMA, 1997).



Hurricanes can result in flooding and high winds causing damage to residential homes (especially mobile homes), businesses, historical buildings, dams, and bridges. Most of Pawtucket is at risk to fire hazard; because of the close urban setting, a fire could spread quickly.

- Population at Risk

There are five emergency shelters throughout the city. Baldwin Elementary School, McCabe Elementary School, Varieur Elementary School, and Jenks Junior High School all have an agreement with the American Red Cross to operate as a mass care facility. The Comfort Inn can also serve as a shelter, but does not have Red Cross certification. None of the shelters are at risk to flood. Total shelter capacity is 1,750, which is sufficient for the city population. In case of an emergency, additional shelters could be established.

- Property at Risk from Flood and Wind Events

The 100-year flood (also referred to as a base flood) is an event that has a 1 percent chance of happening in any given year and is the storm event used to determine the flood zones, which have specific zoning and building requirements throughout the city and state. Since the 1970s, flood ordinances regulated development in floodplains and prohibited structures in the floodplain unless the lowest floor was located above the 100-year base flood elevation.

Pawtucket has suffered property damage from the last few hurricanes due to flooded sewer lines. A significant portion of the city east of the Blackstone River experiences frequent street and basement flooding during heavy rain. This is due to a combination of factors, including the inability of the current combined sewer overflow (CSO) system to handle the runoff during heavy rainfall. The pipes in the CSO system have become clogged with scum buildup over the years, decreasing the capacity of the lines. To help correct this problem, some backflow-prevention valves have been installed where the sanitary line that runs from the house connects to the CSO system.

- Property at Risk from Earthquakes

According to the R.I. Emergency Management Agency (RIEMA), experts believe that earthquakes are likely to strike the eastern half of the country within the next 50 years. The U.S. Geological Survey (USGS) estimates that there is a 40 to 60 percent chance of experiencing an earthquake of magnitude 6.0 or greater on the Richter Scale (1 to 10) in the central or eastern United States within the next 30 years. Buildings that are most at risk from earthquakes are the old masonry buildings and large structures, such as McCoy Stadium.

- Potential Losses to the Local Economy

As seen in Table 1, FEMA estimated that the value of property insured by the NFIP in Pawtucket is over \$7 million.

- Risk Matrix

As a result of the Blackstone Valley public regional workshop in 1997, the city of Pawtucket and other local officials developed a risk assessment matrix which is presented in Table 2. The first component of the risk assessment focused on existing risk and the second component evaluated potential risk.

- Capability Assessment

*"This capability assessment is the critical link between the process of evaluating hazards and developing mitigation strategies."*

—Tennessee Emergency Management Agency

The city implements and enforces the state building code and participates in NFIP, as do all the communities in Rhode Island. The city's emergency operations plan recommends pre- and post-disaster strategies and measures to reduce loss of life and destruction of property. A variety of hazard mitigation strategies were developed following a federal disaster declaration for Hurricane Gloria in 1986.

The city revised its emergency operations plan in 1997. The plan addresses the response to extraordinary emergency situations associated with natural disasters. RIEMA is actively working with Pawtucket to incorporate an Annex K - Municipal Administration Plan for Hazard Mitigation into their existing emergency operations plan.

**MAP 1. MULTI-HAZARD RISK MAP**



**MAP 2. MULTI-HAZARD RISK MAP**



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**Table 2 Risk assessment**

Table 2 continued





Pawtucket has initiated many studies and activities over the years that have laid the foundation for the development of this mitigation strategy. In 1965, the city developed its first comprehensive plan, which was updated in 1995. This plan outlines actions that can be taken to address increased development pressures, economic stability, open space and recreation issues, and public infrastructure and facilities. The comprehensive plan outlines goals, policies, issues, and actions to provide a framework for everyday operations within the city. The city recognized that incorporating mitigation initiatives (both pre-disaster and post-disaster) into the comprehensive plan would not only benefit the community by reducing human suffering, damages, and the costs of recovery, but would also help build and maintain the sustainability and economic health of the city over the long run.

## Section 2.0 – Mitigation Actions

The Local Hazard Mitigation Committee (LHMC) consists of the city emergency management director, the city principal planner, the project engineer for the Department of Planning and Redevelopment, public works director, and the fire chief. This committee has worked to set goals and objectives that are bounded by a time frame and are compatible and consistent with state hazard mitigation goals. The State Hazard Mitigation Committee (SHMC) has reviewed and approved these goals and objectives to ensure consistency with the statewide goals and objectives. The time frames used for this strategy are as follows:

Short Term = 0 to 6 Months

Medium Term = 6 to 18 Months

Long Term = 18 Months to 5 Years

### 2.1 Mitigation Activities

- Mitigation Matrix

The mitigation matrix on page 11 uses the risk assessment matrix to summarize areas at risk and to specify mitigation actions. This matrix also assigns responsible parties to the area at risk. It offers possible finance options and reflects town priorities. For all recommended actions, the lead department or agency responsible for that action is listed first and is followed by other relevant departments/agencies.

- Amend Comprehensive Plan Policies

The LHMC incorporated the theme of hazard mitigation into each of the seven elements in the comprehensive plan. These proposed amendments recognize the impact of natural hazard events and provide guidance on what can be done to protect life, property, natural resources, and the economic health of the city.

The proposed amendments are in *italics* for the following comprehensive plan elements:

#### 1) LAND USE

- Consider possible rezoning of industrial lands that are no longer used or viable for industrial purposes. Consider conservation of open space via acquisition of repetitive loss structures after careful review of overlays.
- Protect existing publicly owned open space and recreational areas through existing floodplain regulations and proper zoning ordinances.
- Protect existing industrial zones and preserve viable vacant industrial sites for industrial uses. Floodproofing measures should be encouraged for sites in the floodplain.

#### 2) HOUSING

- Ensure a balance among residential growth, the conservation of environmental resources, and preservation of recreational and cultural resources through a detailed analysis of the risks and vulnerability of natural hazards.

#### 3) ECONOMIC DEVELOPMENT

- Provide sites suitable for various commercial and industrial activities in relation to projected needs within Pawtucket's land use planning program. Provide sites that are as free as possible from risk to natural hazards for commercial and industrial activities.



- Provide the proper capacity and type of utilities to appropriate locations for economic development activities after a careful assessment of natural hazard risk.

#### **4) NATURAL AND CULTURAL RESOURCES**

- Incorporate mitigation measures, such as retrofitting buildings, to preserve and use, or adaptively reuse structures or sites on the National Register of Historic Places, or in the Local Historical District. For example, elevate or floodproof, install individual fire alarm systems in urban areas where historic buildings are close in proximity.
- Improve the multi-family neighborhoods where most of the residential structures are over 70 years old by bringing these structures up to current floodplain standards.

#### **5) OPEN SPACE AND RECREATION**

- Maintain and improve city recreational and open space resources and programs. Investigate the use of flood-prone areas as open space.

#### **6) COMMUNITY SERVICES AND FACILITIES**

- Promote and improve, where necessary, the services and facilities that are vital to the health, safety and welfare of Pawtucket's citizens, neighborhoods, and its business and industry. The city should consider retrofitting critical facilities, if necessary. For example, City Hall is located at the lowest elevation in Pawtucket and is prone to basement flooding.

#### **7) TRANSPORTATION**

- Provide for public participation in the planning and design of the local and regional transportation system and its functional components which should include emergency evacuation routes and safe (floodproof and seismically designed) bridges.

The city of Pawtucket used the mitigation matrix to recommend mitigation actions for three general categories of risk:

- 1 Residential structures vulnerable to flooding, fire, and high wind
- 2 Bridges and dams subject to flooding, earthquakes, and high wind
- 3 Buildings and service facilities vulnerable to earthquakes, flooding, and fire

## **2.2 Action Plan**

### **1 Residential Structures Vulnerable to Flooding, Fire, and High Winds**

#### **EXISTING CONDITIONS**

Significant flooding has occurred near the Moshassuck River in the vicinity of Greenville Street and Grotto Avenue and upstream of Mineral Spring Avenue. There are several wooden, multi-family housing units for the elderly on Mineral Spring Avenue that are at risk to flooding as well as wind and fire. There are 16 residential structures in the floodplain, most of which are older buildings that have not been brought up to current floodplain standards. Two of the insured structures have reported repetitive losses (more than two significant claims due to floods) since 1978—both cases occurred on Mineral Spring Avenue adjacent to the Moshassuck River. Minor damages were suffered after the last few hurricanes due to flooded sewer lines. Currently, the city is using sand bags to “Band-Aid” flooding problems. The city participates in a regular tree trimming maintenance program that helps protect property from fallen branches and helps keep rivers flowing free from blockage. There is no debris removal or disposal plan.

As mentioned previously, the city along with the Blackstone Valley Electric Company, New England States Emergency Consortium, and RIEMA conducts regular trimming of dead branches—especially near Slater Park—and replants trees with more compatible species to help reduce wind hazard. According to a study conducted by FEMA, if a hurricane similar to that of 1938 were to hit Pawtucket today, all single-family houses would be affected by high winds. In addition, 300 mobile homes outside the floodplain are subject to high winds.

Table 3 11 x 17



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Besides the natural hazards that could affect residential structures directly, there is a wrecking yard located near several homes. If there were fire in this area, it could pose risk to surrounding houses, especially if there were hazardous materials in the wrecking yard.

***ACTION - Revise Implementation Actions in Local Comprehensive Plan***

- a) *LAND USE - Medium Priority.* Consider an expanded riverfront development district outside the floodway with design guidelines and historic district requirements.

**Who:** Department of Planning and Redevelopment, City Planning Commission, Coastal Resources Management Council (CRMC), Department of Environmental Management (DEM)

**When:** Short Term

**Resources Available:** Department of Planning and Redevelopment annual budget for comprehensive plan actions

**Models:** National Trust Information Series, Planning Association

- b) *LAND USE - High Priority.* Encourage neighborhood preservation/revitalization for floodproofing techniques and retrofitting for wind damage.

**Who:** Department of Planning and Redevelopment, City Planning Commission

**When:** Short Term

**Resources Available:** Community Development Block Grant funds

**Models:** FEMA materials

- c) *LAND USE - High Priority.* Develop guidelines for development along the Blackstone River keeping the floodway as entirely open space and elevating houses above the 100-year flood level.

**Who:** Department of Planning and Redevelopment, City Planning Commission, CRMC, DEM

**When:** Short Term

**Models:** FEMA materials

- d) *COMMUNITY SERVICES AND FACILITIES - High Priority.* Separate sanitary and storm sewers if feasible and incorporate best management techniques when undertaking new development or redevelopment projects.

**Who:** Department of Planning and Redevelopment, Public Works Department

**When:** Short Term

**Resources Available:** Local Capital Improvement Program funds

**Models:** American Planning Association

***ACTION - Incorporate Hazard Mitigation into Project Review***

- a) *HOUSING: Natural and Cultural Resources Element - Medium Priority.* For future proposed development design guidelines, review literature to incorporate hazard mitigation provisions, including improved maps.

**Who:** Department of Planning and Redevelopment, City Planning Commission, Historic District Commission, Division of Zoning and Code Enforcement

**When:** Short Term

**Resources Available:** R.I. Historical Preservation and Heritage Commission

**Models:** FEMA materials, National Trust Information Series

***ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs***

- a) *HOUSING - Medium Priority.* Map vulnerable areas and distribute information on the location of these areas and the disaster mitigation program and projects.



**Who:** Department of Planning and Redevelopment, Fire and Police Departments

**When:** Short Term

**Models:** FEMA and URI Coastal Resources Center

- b) ECONOMIC DEVELOPMENT - High Priority.* Develop property tax incentives, such as credits or deductions for floodproofing measures or flood averse measures. Tax undeveloped land at a lower rate.

**Who:** Tax Assessor, City Council

**When:** Medium Term

**Models:** R.I. Hazard Mitigation Project, South Carolina Blue Sky Project

- c) HOUSING - High Priority.* Provide information to contractors and homeowners on risks of building in hazard-prone areas and inform builders and homeowners of the benefits of building and renovating structures to current standards. Provide the public with FEMA floodplain maps and other technical information developed by FEMA, state agencies, and other qualified institutions to assist the public with understanding the risks and the options for mitigation. Develop a list of appropriate techniques for homeowner self-inspection and subsequent implementation of mitigation activities.

**Who:** City Staff, State Agencies, Private Sector, Building Officials

**When:** Short Term

**Resources Available:** FEMA, Office of Statewide Planning-Flood Plain Management Program, Sea Grant fact sheets, Institute for Business and Home Safety (IBHS), Blue Sky Project, Clemson State University fact sheets on World Wide Web (WWW); FEMA WWW

**Models:** IBHS Retrofit Guidelines for one- and two-family residences

- d) COMMUNITY SERVICES AND FACILITIES - Medium Priority.* Maintain/upgrade sewer systems in flood-prone areas. Install backflow-prevention valves for CSO systems.

**Who:** Narragansett Bay Commission

**When:** Short Term

**Resources Available:** Low-interest bank loans

**Models:** Pawtucket's ISDS upgrade program, Greenwich Bay Initiative

- e) LAND USE - High Priority.* Incorporate a "hazard disclosure" requirement in deed transfers, leases, or other contracts for sale or exchange of lots within flood hazard areas. Such documents should also carry a flood hazard warning. Include such provisions in subdivision approvals.

**Who:** City Clerk, Planning Commission, Building Inspector, City Council, Realtors

**When:** Short Term

**Models:** Florida Model Flood Management Ordinance

#### ***ACTION - Determine Post-Disaster Mitigation Opportunities***

- a) Schedule several meetings to provide information and receive comments on federal, state, and local performance after a disaster event - High Priority.*

**Who:** City of Pawtucket Emergency Management Agency, Public Safety Director, Fire and Police Departments

**When:** Short Term

**Resources Available:** Clemson State University fact sheets on WWW; FEMA WWW

**Models:** IBHS Retrofit Guidelines for one- and two-family residences



## EXISTING CONDITIONS

There are four low lying bridges/culverts subject to flooding where branches from fallen trees could clog the drainage flow creating flooding: Interstate 95 over the Moshassuck River; Mineral Spring Avenue culvert over the Moshassuck River; Roosevelt Avenue bridge over the Blackstone River; and Exchange Street bridge. Main Street, Central Avenue, Interstate 95 over the Seekonk River, and Division Street are all high bridges that are in good condition and could be used for evacuation over the Moshassuck and Blackstone rivers.

There are a four major dams in the city, three of which are privately owned:

1. Pantex/Elizabeth Webbing Mill Dam (FERC No. 64) is owned by the Roosevelt Hydroelectric Company. This dam is located on the Moshassuck River. It was found to be in good condition and of significant hazard. This dam is considered as a significant hazard because failure could cause loss of life. The dam was inspected in 1982 and again in 1987 and found in good condition. Some remedial work was done in 1982 to remove tree limbs.

2. Slater Mill Dam/Pawtucket Upper Dam (No. 65) is owned by the Slater Mill Association. This dam is located on the Blackstone River. In July 1995, a 30-foot-wide hole was repaired. In August 1995, the electric company conducted an inspection because of foundation problems. Northeast Utilities repaired the sluice gate, but the base abutment still needs repair.

3. Main Street Dam (FERC No. 2) is owned by the Blackstone Valley Electric Company. This dam is located on the Blackstone River. In 1982, the dam underwent remedial repair with crushed stone. The last inspection was in 1986. The Army Corps of Engineers (COE) suggested that removal of the dam be considered. This is a low hazard dam in good condition, which means minimum property damage could occur with a dam failure, but no loss of life is expected.

4. Ten Mile River Reservation/Golf Club Dam is owned by DEM. This dam is located on the Ten Mile River and is considered low hazard.

According to the COE, as of November 1997, all dams were found in good condition. The Woonsocket Falls dam is monitored by computer sensors and is hooked up to an alarm system. As of July 1, 1997, three new alarms have been added to the Thundermist Hydroelectric Plant in Woonsocket. Currently, the city is working on installing some type of flood stage markers in order to monitor the Blackstone River level and buy some more lead time for evacuation.

## ***ACTION - Revise Implementation Actions in Local Comprehensive Plan***

a) **TRANSPORTATION - Low Priority.** In case of high winds, a formal procedure should be in place for closure of bridges and creation of alternative evacuation routes.

**Who:** City Officials, Public Works Department, Public Safety and Local Police Departments

**When:** Short Term

b) **TRANSPORTATION - Medium Priority.** Implement bridge repair and rehabilitation to Conant Street and Cole Street bridges and others as identified through the R.I. Department of Transportation (RIDOT) Bridge Repair Program.

**Who:** RIDOT, Department of Public Works

**When:** Long Term

**Resources Available:** State transportation bond issues

## ***ACTION - Incorporate Hazard Mitigation into Project Review***

a) **COMMUNITY SERVICES AND FACILITIES - High Priority.** Project review should include evaluation of the impact of proposed development on evacuation routes. Mitigation (e.g., road upgrade, culvert upgrade, new road) should be required where new development may affect evacuation. Also, evacuation routes should be practiced.

**Who:** Department of Planning and Redevelopment, Public Works Department

**When:** Short Term



**Resources Available:** R.I. Geographical Information Systems, COE National Hurricane Center's sea, lake, and overland surges from hurricane (SLOSH) computer model, RIEMA

*b) COMMUNITY SERVICES AND FACILITIES - Medium Priority.* High wind events will cause old and weakened trees to fall, creating a great amount of debris that must be picked up and disposed of either within Pawtucket or the central landfill. This debris often gathers underneath bridges, which will affect water flow. A plan listing disposal locations and most suitable sites should be created. Regular tree pruning and replanting should be continued.

**Who:** Department of Planning and Redevelopment, Public Works Department

**When:** Short Term

**Resources Available:** RIEMA

*c) COMMUNITY SERVICES AND FACILITIES - High Priority.* Stream gauge and flood stage markers should be installed in several key locations along the Blackstone River in order for the National Weather Service to monitor the water level and better predict the lead time along the river.

**Who:** Pawtucket Fire Department, Public Works Department, the National Weather Service, USGS

**When:** Short Term

**Resources Available:** National Weather Service, Northeast Region

#### ***ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs***

*a) COMMUNITY SERVICES AND FACILITIES - High Priority.* Provide a training program. Organize and conduct training opportunities for officials, employees, boards, and commissions regarding natural hazards and hazard mitigation.

**Who:** City Officials, Board and Commission Members

**When:** Medium Term

**Resources Available:** RIEMA, URI Coastal Resources Center

#### ***ACTION - Determine Post-Disaster Mitigation Opportunities***

*a) Document problems associated with disasters for future mitigation activities - High Priority.*

**Who:** City Staff, RIEMA

**When:** Medium Term

**Resources Available:** RIEMA, FEMA

*b) Reevaluation of evacuation plan for the city - High Priority.*

**Who:** City Staff, RIEMA, Fire and Police Departments, Pawtucket School Department

**When:** Short Term

**Resources Available:** RIEMA, FEMA

### **3** *Buildings and Service Facilities Vulnerable to Earthquakes, Flooding, and Fire*

#### **EXISTING CONDITIONS**

Currently, 32 structures in the floodplain are vulnerable to basement flooding, including City Hall, which is situated at the lowest elevation in the city. Slater Mill, a national historic landmark and tourist attraction, is also on the bank of the Blackstone River. The city has contacted officials at Slater Mill to explore possible floodproofing measures. The city has also made an effort to contact local businesses that are in the floodplain. Pawtucket officials plan to continue this effort if federal grants are available for public education.





Land use and site selection for critical facilities is key. McCoy Stadium is one of the major economic structures subject to earthquake damage because it is built on filled land that was once a pond. Some of the risks from earthquakes include building collapse, disruption of sewer lines, water lines, and land communication lines.

Earthquakes are a greater risk than most people realize. There have been 31 recorded earthquakes in this state over the last 220 years. Rhode Island can feel the effects of an earthquake occurring in the Northeast Region. Rhode Island has experienced several minor earthquakes in the last few years, but no extensive damage has occurred.

Fire is another risk in Pawtucket because of the closely built urban environment. Many of the wooden structures are close together which would allow fire to spread easily.

### ***ACTION - Revise Implementation Actions in the Local Comprehensive Plan***

- a) *COMMUNITY SERVICES AND FACILITIES - High Priority:* Review plans for adequacy of design to meet drainage requirements. Make storm drainage improvements.

**Who:** City Engineer, Public Works Department

**When:** Short Term

**Resources Available:** City annual budget

**Models:** Engineering design manuals

- b) *COMMUNITY SERVICES AND FACILITIES - Medium Priority:* Implement building repairs, revise code requirements and routine maintenance recommendations.

**Who:** Public Works Department

**When:** Short Term

**Resources Available:** Annual Capital Improvement Program

- c) *NATURAL AND CULTURAL RESOURCES - High Priority:* In cooperation with DEM, assess the water quality impacts and potential fire hazard of material salvage yards along the Blackstone and Moshassuck rivers and implement mitigation measures as required.

**Who:** City of Pawtucket, DEM, CRMC

**When:** Short Term

**Resources Available:** State transportation bond issues

- d) *COMMUNITY SERVICES AND FACILITIES - High Priority:* Maintain publicly owned buildings and facilities in accordance with sound building maintenance procedures, and implementing structural modifications that ensure the overall integrity of the buildings, including handicapped accessibility.

**Who:** City of Pawtucket

**When:** Short Term

**Resources Available:** FEMA, revised state building codes

- e) *COMMUNITY SERVICES AND FACILITIES - Medium Priority:* Initiate the examination and retrofitting of unreinforced concrete structures and other types of structures for earthquake and flood protection.

**Who:** Private Industry, State of Rhode Island, Narragansett Bay Commission

**When:** Short Term

**Resources Available:** Tax credits

### ***ACTION - Incorporate Hazard Mitigation into Project Review***

- a) *NATURAL AND CULTURAL RESOURCES - High Priority:* Provide design assistance and design review guidelines for historic and nonhistoric structures, including possible retrofitting measures for flooding, fire, and earthquake mitigation.

**Who:** Department of Planning and Redevelopment, Historic District Commission

**When:** Ongoing and Short Term



**Resources Available:** City annual budget

**Models:** National Trust Information Series, "Safeguarding Your Historic Site" (FEMA-Region I)

- b) COMMUNITY SERVICES AND FACILITIES - High Priority.* Upgrade publicly owned buildings and facilities in accordance with sound building maintenance procedures, and implement structural modifications that ensure the overall integrity of the buildings, including handicapped accessibility.

**Who:** City of Pawtucket

**When:** Short Term

**Resources Available:** FEMA, revised state building codes

***ACTION - Develop and Implement Public Education, Outreach, and Incentive Programs***

- a) SERVICES AND FACILITIES - Low Priority.* Participate and help organize statewide public education sessions to explain flood and earthquake hazards, and follow up with modification to the state building code.

**Who:** RIEMA, FEMA, Rhode Island Builders Association, State Building Commissioner

**When:** Medium Term

- b) HOUSING - High Priority.* Revise local building assessment practices to include stricter assessments and to include retrofitting suggestions.

**Who:** State of Rhode Island

**When:** Medium Term

***ACTION - Determine Post-Disaster Mitigation Opportunities***

- a) Evaluate the feasibility of replacing undersized culverts with properly sized facilities - High Priority.*

**Who:** Public Works Department, RIDOT

**When:** Post-disaster

**Resources Available:** Local and state bond issues disaster funding

- b) Incorporate adequate drainage facilities into design for road repair - Medium Priority.*

**Who:** Public Works Department, RIDOT, CRMC

**When:** Post-disaster

**Resources Available:** Local and state bond issues disaster funding

- c) Acquire land susceptible to fire for conversion to open space - Low Priority.*

**Who:** City of Pawtucket, State of Rhode Island

**When:** Short Term

- d) Conduct a structural review of facilities affected by the disaster - Medium Priority.*

**Who:** City Staff, RIEMA

**When:** Medium Term

**Resources Available:** RIEMA, FEMA

## 2.3 Implementation Schedule

The LHMC realized that assigning a time frame to each recommended mitigation action is important so that activities are coordinated with other important governmental functions, such as budget hearings. Assigned time frames also provide a guideline for tracking the progress of all activities. Time frames are incorporated in Section 2.0.



## 2.4 Strategy Adoption

Pawtucket's Hazard Mitigation Strategy was approved for adoption by the LHMC and the city planning commission on October 21, 1997, and by the City Mayor on February 11, 1998. The next step was to gain the approval of the SHMC, the executive director of RIEMA, and FEMA Region I.

The members of the LHMC, along with the city planning commission, will recommend that these actions become amendments to the Pawtucket Comprehensive Plan. These actions will need city council approval as amendments to the comprehensive plan.

## 2.5 Implementation, Evaluation, and Revision of Strategy

*"The success of the hazard mitigation plan is measured by the degree to which actions are accomplished. Without the implementation and maintenance of the plan, the previous components have merely been an effort in research void of any practical application."*  
—Tennessee Emergency Management Agency

### Implementation

In order to establish the authority and accountability for implementation, Pawtucket suggested amendments to its comprehensive plan to incorporate the theme of natural hazard mitigation. The second step was to continue to implement actions that enable preventive or protective measures to be accomplished. The third step was to prioritize the recommended actions based on criteria the community established (see mitigation matrix). Pawtucket is now acting on securing sufficient resources to carry out these recommended actions.

### Evaluation

The LHMC and other local officials plan to meet every six months to ensure that the mitigation actions are being implemented in accordance with the assigned time frames and that the strategy is updated. They will monitor and document progress.

### Revision

The local strategy will be updated once a year. The update should be reviewed and submitted to RIEMA upon local approval to ensure that the state hazard mitigation strategy also remains current.

#### Statement from the LHMC:

"The LHMC will meet biannually after a disaster event to monitor, evaluate, and update this local strategy. An annual meeting will be advertised and within two months of this meeting, a status report will be given to the planning commission and city council. This strategy will then be approved by a local governing body and submitted to RIEMA for final approval."



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Tsiatas, George, and J. R. Brunozi. Seismic Vulnerability Study of Rhode Island, 1994.

Vallee, David. Rhode Island Hurricanes and Tropical Storms: A Fifty-Six Year Summary 1936-1991.

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Victor Parmentier, Rhode Island State Floodplain Manager, State Division of Planning

Michele Steinberg, FEMA Region I Mitigation Division

David Stroud, Insurance Services Organization



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## Appendices

- A. Technical and Financial Assistance for Mitigation
- B. Existing Protection Systems-Federal and State
- C. Public Information and Outreach



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## Technical and Financial Assistance for Mitigation

### State Resources

#### **Rhode Island Emergency Management Agency**

645 New London Avenue  
Cranston, RI 02920  
(401) 946-9996

#### **Coastal Resources Center**

University of Rhode Island  
Narragansett Bay Campus  
Narragansett, RI 02882  
(401) 874-6224

#### **Coastal Resources Management Council**

Stedman Government Center  
4808 Tower Hill Road  
Wakefield, RI 02879  
(401) 222-2476

#### **Department of Administration/Division of Planning**

One Capitol Hill  
Providence, RI 02908  
(401) 222-6478

#### **State of Rhode Island Building Committee Office**

Building Commissioner's Office  
One Capitol Hill  
Providence, RI 02903  
(401) 222-3529

#### **Rhode Island Builders Association**

The Terry Lane Corporation  
Terry Lane  
Gloucester, RI 02814  
(401) 568-8006

#### **Department of Transportation-Design Section/Bridges**

2 Capitol Hill, Room 231D  
Providence, RI 02903  
(401) 222-2053

#### **Rhode Island Department of Business Regulations**

233 Richmond Street  
Providence, RI 02903  
(401) 222-2246

#### **State Fire Marshal's Office**

272 West Exchange Street  
Providence, RI 02903  
(401) 222-2335

#### **Rhode Island Banking Commission/ Associate Director**

233 Richmond Street  
Providence, RI 02903  
(401) 222-2405

#### **Public Utilities Commission**

100 Orange Street  
Providence, RI 02903  
(401) 222-3500 Ext. 153

#### **Department of Environmental Management**

Division of Parks and Recreation  
2321 Hartford Avenue  
Johnston, RI 02919  
(401) 222-2635





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## Federal Resources

### **Federal Emergency Management Agency**

Mitigation Division  
Region I Office  
J.W. McCormack POCH, Room 462  
Boston, MA 02109  
(617) 223-9561

### **U.S. Army Corps of Engineers**

New England District  
424 Trapelo Road  
Waltham, MA 02254  
(617) 647-8505

### **U.S. Department of Agriculture**

Natural Resources Conservation Service  
(formerly Soil Conservation Service)  
451 West Street  
Amherst, MA 01002  
(413) 253-4362

### **U.S. Department of Commerce**

#### **National Weather Service**

Forecast Office  
445 Myles Standish Boulevard  
Taunton, MA 02780  
(508) 823-2262

### **Economic Development Administration**

143 North Main Street, Suite 209  
Concord, NH 03301  
(603) 225-1624

### **U.S. Department of the Interior**

#### **National Park Service**

Rivers and Trails Conservation Program  
Regional Office  
15 State Street  
Boston, MA 02109  
(617) 223-5203

### **U.S. Fish and Wildlife Service**

New England Field Office  
22 Bridge Street, Unit #1  
Concord, NH 03301-4986

### **U.S. Department of Housing and Urban Development**

Community Development Block Grants  
Region I - O'Neill Federal Building  
10 Causeway Street  
Boston, MA 02222  
(617) 565-5354

### **Small Business Administration**

360 Rainbow Boulevard South, 3rd Floor  
Niagara Falls, NY 14303  
(716) 282-4612 or (800) 659-2955

### **U.S. Environmental Protection Agency**

Region I - JFK Federal Building  
Government Center  
Boston, MA 02203  
(617) 565 3400



## ***Other Resources***

### **The Association of State Floodplain Managers (ASFPM)**

Professional association with a membership of almost 1,000 state employees that assists communities with the NFIP. ASFPM has developed a series of technical and topical research papers and a series of proceedings from their annual conferences. Many mitigation “success stories” have been documented through these resources and provide a good starting point for planning.

#### *Floodplain Management Resources Center*

Free library and referral service of the ASFPM for floodplain management publications. Co-located with the Natural Hazards Center at the University of Colorado in Boulder, staff can use keywords to identify useful publications from the more than 900 flood-related documents in the library.

#### *Institute for Business and Home Safety (IBHS)*

(formerly Insurance Institute for Property Loss Reduction)

An insurance industry-sponsored, nonprofit organization dedicated to reducing losses—deaths, injuries, and property damage—resulting from natural hazards. IBHS efforts are directed at five specific hazards: flood, windstorm, hail, earthquake, and wildfire. Through its public education efforts and information center, IBHS communicates the results of its research and statistical gathering, as well as mitigation information, to a broad audience.

#### *Volunteer Organizations*

Organizations, such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith, and the Mennonite Disaster Service, are often available to help after disasters. Service organizations, such as the Lions, Elks, and VFW are also available. These organizations have helped others with food, shelter, clothing, money, etc. Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings incorporating mitigation or floodproofing concepts. The offices of individual organizations can be contacted directly, or the FEMA Regional Office may be able to assist.

#### *Flood Relief Funds*

After a disaster, local businesses, residents, and out-of-town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches, or an ad hoc committee. No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all sources of public disaster assistance. Doing so allows the funds to be used for mitigation and other projects that cannot be funded elsewhere.

#### *New England States Emergency Consortium (NESEC)*

Lakeside Office Park

NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Brochures and videotapes are available on such topics as earthquake preparedness, mitigation, and hurricane safety tips. NESEC maintains a WWW home page that is accessible at <http://www.serve.com/NESEC>.

#### *The New England Floodplain and Stormwater Managers Association (NEFSMA)*

Professional organization for New England floodplain and stormwater managers. Provides workshops, conferences, and a newsletter to membership and interested individuals and companies. Contact: Nicholas Winter, chairman, at (617) 727-0488 or the NEFSMA home page on the Web at <http://www.seacoast.com/~nefsma>.



## Existing Protection Systems – State and Federal

### State

#### Earthquakes and Hurricanes

A certain amount of funding is allotted to each state per year based on a risk formula for earthquakes. Coastal states are allocated funds based on a risk formula for hurricanes. Each state receiving such funds has the ability to grant project funds to a community. There is not a match requirement on the part of the community, but the funds are limited, and are generally only available once a year. The projects or products proposed for such funding must demonstrate that earthquake or hurricane risk will be reduced or eliminated, and that the proposed project or product is a cost-effective measure (a stringent cost/benefit analysis need not be performed). Information about the amount of funding available per year and the state requirements for eligibility and performance may be obtained from RIEMA at (401) 946-9996.

#### Economic/Community Development

There may be programs existing to help floodproof homes using Community Development Block Grant funds. There may be housing assistance programs in the community that can be used following a major flood, achieving both the objectives of reducing flood damage and improving the community's housing stock (see Appendix A, Federal Resources, for more information).

#### Evacuation Plans and Systems

Your community's emergency operations center should have evacuation plans in place. For communities near a nuclear power plant, evacuation plans are required, and may also be used for flood evacuation. RIEMA may have additional evacuation plan information.

#### Land Use Restrictions

There are several federal and state regulations that serve to restrict land use in certain areas that may help reduce flood hazard vulnerability. If your community has open land owned by the state or federal government, examine what restrictions are placed on its development. In addition, the state Wetlands Protection Act regulates the development of all lands identified as significant to the protection of resources identified in the act.

#### Septic Systems

If there are areas in the community not served by a public sewer system, state septic system regulations influence development and may be a consideration for mitigation alternatives that include rebuilding and elevation of structures. Specific design requirements must be met for any construction in coastal velocity zones or river floodways. Generally, an inspection of a septic system is required if there is a change in use of the structure, an increase in flow, or a failed system. Limited inspections are required if the footprint of the structure is being changed. Upgrades are required by the state if an inspection reveals a failed system. However, local regulations may be more restrictive than state requirements, requiring inspections or upgrades in other cases.

#### State Barrier Beaches

Your community may have barrier beaches, as defined by the state's Coastal Resources Management Program. The regulations applying to these areas are enforced by CRMC. These regulations restrict alteration of the beach and/or dunes and the construction of coastal engineering structures. New or substantially reconstructed buildings generally must be elevated to a minimum of 1 foot above base flood elevation. No new commercial development is allowed on barrier beaches. If a structure is damaged more than 50 percent, it cannot be rebuilt.

#### Warning Systems and Emergency Operations Plans

Your community may have a flood warning system in place and should have a plan for response to flooding. In addition, RIEMA has offices throughout the state that maintain area-wide plans for flood events.



## Federal

### Coastal Barrier Resource Act

Administered by the U.S. Fish and Wildlife Service, this program has mapped public and private land identified as undeveloped coastal barrier areas. These areas may be denoted as “Otherwise Protected Areas” if they are owned by public entities. In the coastal barrier areas shown on FEMA’s flood insurance rate maps, structures newly built or substantially improved after the date shown on the maps are ineligible for federal flood insurance. This serves to restrict new development in these areas because the purchase of flood insurance is required to obtain federally backed mortgages and improvement loans for structures located in special flood hazard areas.

### Community Rating System (CRS)

A voluntary initiative of the NFIP, the CRS was developed to encourage communities to perform activities that exceed the minimum NFIP floodplain management standards. If a community participating in the CRS performs activities that include maintaining records for floodplain development, publicizing the flood hazard, improving flood data, and conducting floodplain management planning, then the flood insurance premiums paid by policy holders in the community will be reduced by 5 to 45 percent. Developing a flood mitigation plan will help communities gain additional credit under the CRS.

### Hazard Mitigation Grant Program

Also known as the 404 Program or HMGP, this program is available only after a federally declared disaster occurs. It represents an additional 15 percent of all the infrastructure and individual assistance funds that are provided to states to repair damages and recover from losses, and is administered by the state in partnership with FEMA. Having a plan or completed mitigation action matrix prior to a disaster event is extremely helpful in meeting the state’s deadlines for applications and ensuring the project is eligible and technically feasible. It provides 75/25 matching grants on a competitive basis to state, local, and tribal governments, as well as to certain nonprofit organizations that can be matched by either cash or in-kind services. The grants are specifically directed toward reducing future hazard losses, and can be used for projects protecting property and resources against the damaging effects of floods, earthquakes, wind, and other hazards. Specific activities encouraged under the HMGP include acquiring damaged structures to turn the land over to the community for open space or recreational use, relocating damaged or damage-prone structures out of the hazard area, and retrofitting properties to resist the damaging effects of disasters. Retrofitting can include wet- or dry-floodproofing, elevation of the structure above flood level, elevation of utilities, or proper anchoring of the structure.

Two programs that have been authorized under the National Flood Insurance Reform Act of 1994 include the Flood Mitigation Assistance (FMA) program and a provision for increased cost of compliance (ICC) coverage. FMA makes grants available on a pre-disaster basis for flood mitigation planning and activities, including acquisition, relocation, and retrofitting of structures. FMA grants for mitigation projects will be available only to those communities with approved hazard mitigation plans. ICC coverage has recently been implemented for all new NFIP policies and renewals and is intended to be “mitigation insurance” to allow homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of \$15,000. A certain amount of funding is allotted to each state per year based on a risk formula for floods. Each state has the discretion to award funds to communities or to state government agencies. States may use whatever criteria or method they choose to award the funds as long as the applicant and the proposal are eligible. The program may fund up to 75 percent of the total cost of the proposed project, with a minimum of 25 percent of the cost coming from the community. A minimum of half the community share must be cash or “hard match.” Funds can also be granted to communities to help them prepare local flood mitigation plans. The same match requirements apply. Once a community receives a planning grant, however, it is not eligible to receive additional planning grants for another five years. For further information on the FMA program or ICC coverage contact RIEMA at (401) 946-9996.

### National Flood Insurance Program (NFIP)

All of Rhode Island’s 39 municipalities participate in the NFIP. This program is a direct agreement between the federal government and the local community that flood insurance will be made available to residents in exchange for community compliance with minimum floodplain management regulations. Communities participating in the NFIP must:

- Adopt the flood insurance rate maps as an overlay regulatory district
- Require that all new construction or substantial improvement to existing structures in the flood hazard area be elevated or (if nonresidential) floodproofed to the identified flood level on the maps
- Require design techniques to minimize flood damage for structures being built in high hazard areas, such as floodways or velocity zones

In return for community adoption of these standards, any structure in that community is eligible for protection by flood insurance, which covers property owners from losses due to inundation from surface water of any source. Coverage for land subsidence, sewer backup, and water seepage is also available subject to the conditions outlined in the NFIP standard policy (see Appendix A, Federal Resources, for contacts regarding insurance coverage and purchase). Since homeowners insurance does not cover flooding, a community's participation in the NFIP is vital to protecting property in the floodplain as well as being essential to ensure that federally backed mortgages and loans can be used to finance floodprone property.



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## Public Information and Outreach



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